# MoistureMap:

## A soil moisture monitoring, prediction and reporting system for sustainable land and water management

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### Introduction

Accurate knowledge of current and future spatial variation in surface and root zone soil moisture at high resolution is critical for achieving sustainable land and water management. The fundamental limitation is that spatial and temporal variation in soil moisture is not well known, nor easy to measure or predict. Consequently, a prototype soil moisture monitoring, prediction and reporting system is being developed for Australia, with the Murrumbidgee as the demonstration catchment. The system will provide current and future soil moisture information and its uncertainty at 1km resolution, by combining weather, climate and land surface model predictions with soil moisture data from the European Space Agency's Soil Moisture and Ocean Salinity (SMOS) satellite scheduled for launch in May 2009; the first-ever dedicated microwave soil moisture mission. A significant component of this project is developing and testing the soil moisture retrieval algorithms to be used by SMOS and verifying the SMOS data for Australian conditions.

### MoistureMap System Development

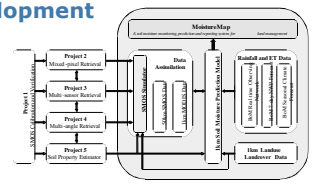


**Fig. 1** Schematic of the MoistureMap system.

### Airborne Instruments

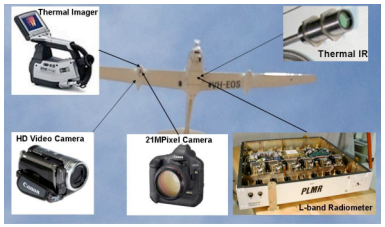


**Fig. 2** Airborne instruments to be used during the campaigns

### Ground-based Observations

- surface and profile soil moisture
- surface and profile soil temperature
- surface roughness
- soil core samples
- vegetation characterisation

### Study Regions

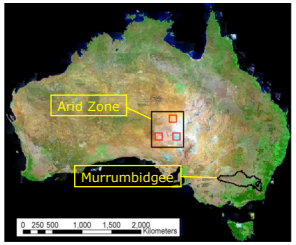


**Fig. 3** Location of potential SMOS cal/val sites (red) in Central Australia and the Murrumbidgee Catchment.

### MoistureMap Projects

**Project 1: SMOS Cal/Val**

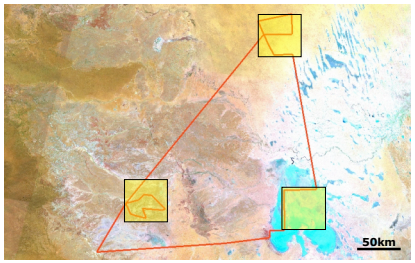


**Fig. 4** Central Australian arid zone (SMOS calibration sites). Low-resolution focus regions (1km; yellow) and high-resolution flight lines (50m; red)

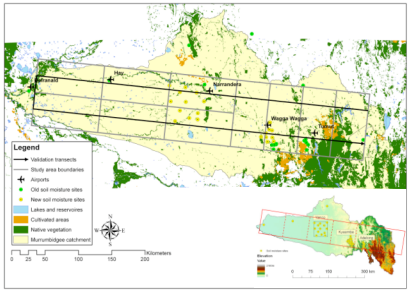


**Fig. 5** Murrumbidgee catchment with proposed coverage areas (SMOS validation sites), repeat reference flight (thick black), profile soil moisture monitoring stations (dots), and topography (inset).

**Project 2: Mixed-Pixel Retrieval**

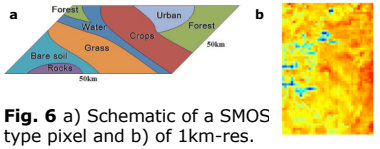


**Fig. 6** a) Schematic of a SMOS type pixel and b) of 1km-res. PLMR data over a partially irrigated area

**Project 3: Multi-Sensor Retrieval**

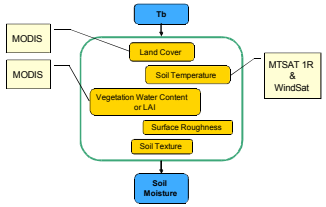


**Fig. 7** Schematic of input variables into a radiative transfer model and their potential remote sensing sources.

**Project 4: Multi-Angle Retrieval**

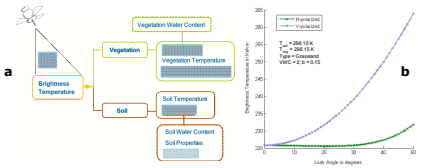


**Fig. 8** a) Schematic of variables affected by and b) brightness temperatures as a function of the incidence angle.

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